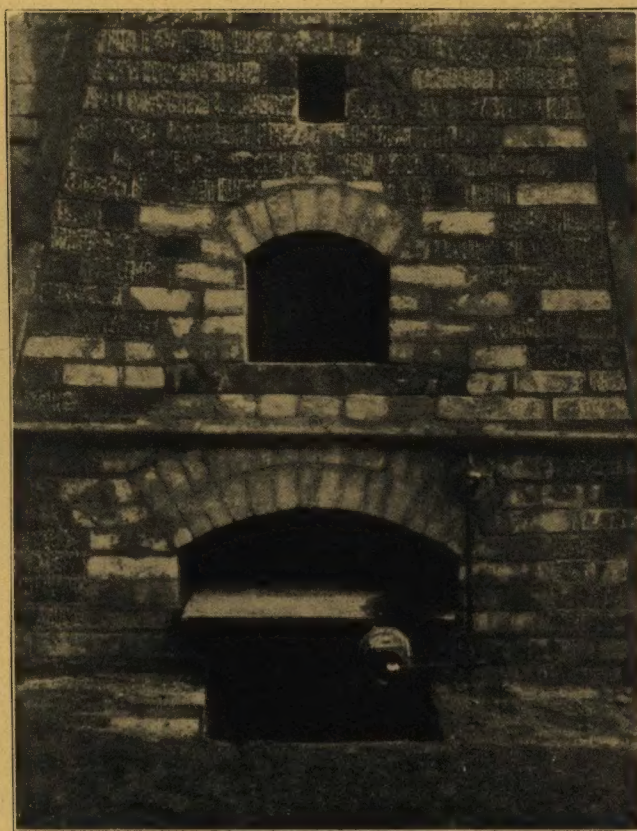


THE
FURNACE GAS
PRODUCER



International Clay Machinery Co.

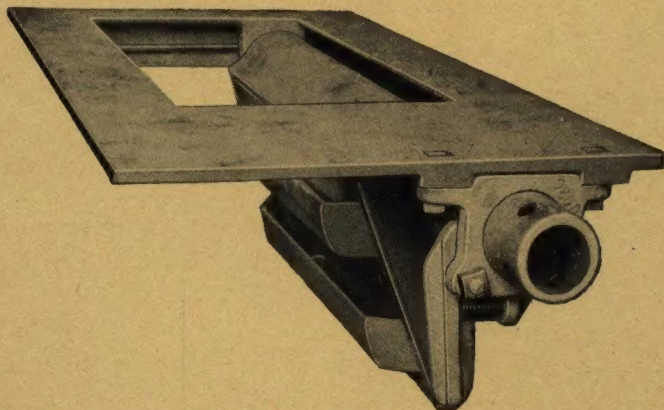
DAYTON, OHIO, U. S. A.

New York Office, 136 Liberty Street

THE FURNACE GAS PRODUCER

WHAT IT IS

The Furnace Gas Producer is a device built on a broadly patented principle, which replaces but improves upon regular grate bars in fire boxes, changing each fire box into a gas producer in itself.



The Furnace Gas Producer with Trunnion Dumped

(a) It is a time, fuel and labor saver, one that is simple to install and operate, the cost of installation being so small as to be surprising. The price is not a drawback as in earlier types of fuel economizers.

(b) It is another and great step forward in the development of the clay industry—in the most expensive division of the clay industry—namely, the heat treating of the ware.

(c) It can be installed by anybody between burns and requires no skilled help or high grade fuel to operate it.

For periodic kilns, either of updraft or downdraft type, burning brick and tile, fire brick, sewer pipe, colored or white ware, standard sizes are built. For use with different types of continuous kilns, for boilers, etc.—other sizes and other designs are used, all covered by patents.

WHAT IT DOES

Shortens Burning Time: The Furnace Gas Producer is shortening the burning time on kilns, by an average of 25 to 50%. In numbers of instances where the original burning time with grates had been in the neighborhood of 8 days, the Furnace Gas Producer shortened this to from 4½ to 5 days. In the burning of sanitary ware, the Furnace Gas Producer has shortened the time from an average of 48 to an average of 36 hours.

Saves Fuel: The Furnace Gas Producer has been successful in cutting down the fuel consumption on kilns, by 25 to 50%.

Saves Labor: Because of the shortening of the time and fuel consumption, there is a direct saving in the burning labor. Furthermore, as clinkering is practically eliminated the work of the fireman is made much lighter.

Better Ware: It is bringing about a better class of ware, because the atmospheric conditions within the kiln are at all times under absolute control.

Smoke Eliminated: With ordinary grates when a fresh charge of coal is thrown on the fires, the amount of air that can pass thru the fires is not sufficient to thoroughly burn up all of the coal, so that as a consequence much of the carbon passes out thru the stack in the form of smoke. With the Furnace Gas Producer it is only necessary to increase the blast of steam which draws in with it an increased supply of air, so that all of the carbon is consumed and no smoke will result. The smoke elimination is strikingly shown in the cut on page 4. This absence of smoke, of course, means greater returns from each pound of coal.

INTERNATIONAL CLAY MACHINERY COMPANY, DAYTON, OHIO, U. S. A.

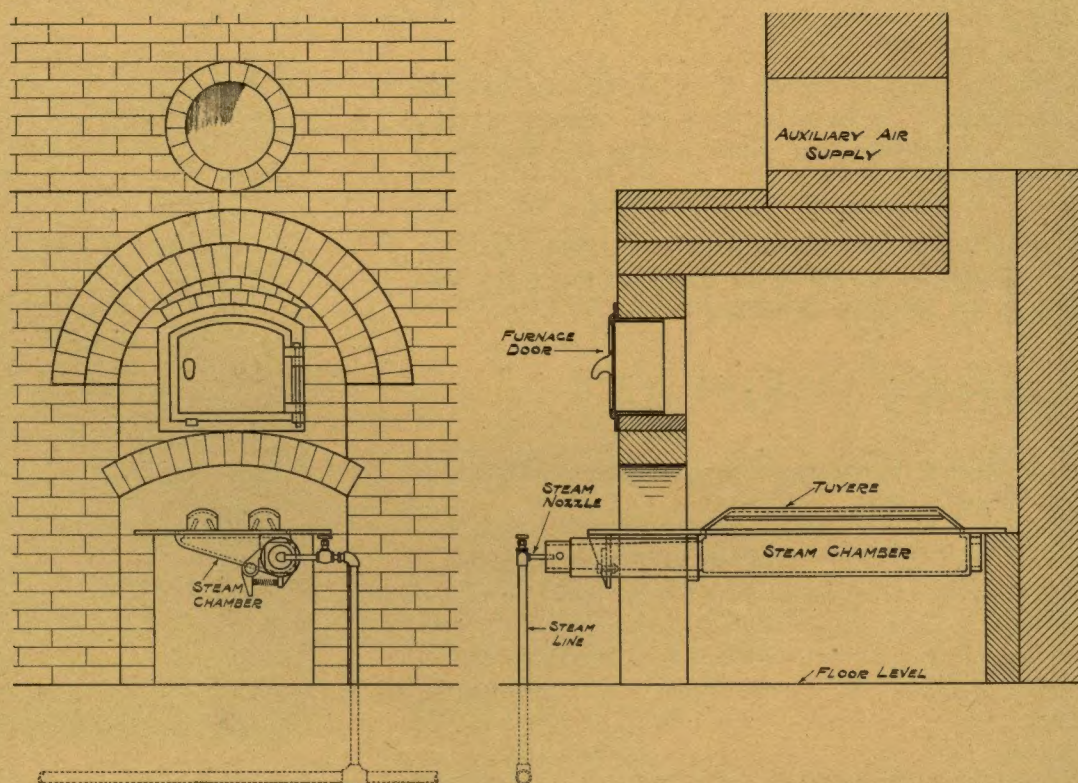
TRY IT OUT ON ONE KILN

No Carbon in Ashes: The Furnace Gas Producer so efficiently burns the coal that there is practically no carbon in the ashes, and the ashes drop into the pit in powdery form.

Burns Any Ordinary Coal: High grade coal is not required for use with the Furnace Gas Producer as with other producer gas installations. It will literally burn anything that has carbon in it. In one case it was possible for the user to substitute his clay bank coal for a higher grade coal that he had been using, and even then he was troubled less with ashes than he had been with the better grade coal on his ordinary grates.

It Salt Glazes: All manufacturers of salt glazed products know that in order to obtain the best glaze it is necessary that the salt be thoroughly volatilized. To do this, an intense local heat with a clear fire is required. The Furnace Gas Producer gives such conditions better than any other method of burning we know of, because of the ability to send a blast thru the fuel bed. Just before throwing on the salt, the steam jet is opened up so that a blast of steam and air passes thru the fuel bed, giving within a few moments a perfect fire for salt glazing.

It Flashes: On the other hand, where flashing conditions are desired, the Furnace Gas Producer can be so operated as to give a long reducing flame, with combustion taking place right around the ware.



Typical Setting of Furnace Gas Producer in Average Fire Box

INTERNATIONAL CLAY MACHINERY COMPANY, DAYTON, OHIO, U. S. A.

IT IS SAVING 25-50% BURNING COSTS



Photograph of Pyrometric Records Representing Difference in Burning Time

HOW IT SAVES

The Furnace Gas Producer saves time, simply because it gives you absolute control of the kiln, by giving you control of the fires. With ordinary grate bars the speed with which you can increase the temperature is limited by the condition of the kiln. With the Furnace Gas Producer your fires are independent to a great extent of the kiln condition.

The Furnace Gas Producer saves coal because first of all it cuts the time of burning. Then a smaller quantity of excess air is required than with grate bars and this is also a source of economy. There is no time or fuel lost thru cleaning of fires, with a consequent drop in temperature during that process, also the cleaning of fires is simplified.

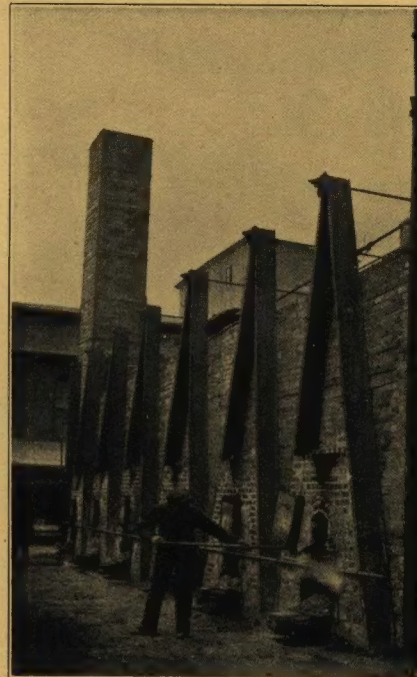
There is practically no carbon left in the ashes and no smoke issuing from the stack. The flame is a long one, combustion taking place in the kiln around the ware where it does the most good, instead of in the fire box.

All of this boiled down means that the Furnace Gas Producer gives you control of the kiln at all times, and that is the key-stone of economy and efficiency in burning.

WHAT USERS SAY

A Fire Brick Manufacturer burning to 2800 deg. F. submits the following data:

	Hand Fired Kiln	Furnace Gas Producer
Number of Brick in Kiln.....	25,597	28,153
Burning Time.....	6 days	3 days 14 hours
Total coal consumption.....	56,270 lbs.	41,970 lbs.
Total ash per kiln.....	4,370 lbs.	3,210 lbs.
Coal per M brick.....	2,171 lbs.	1,491 lbs.
Coal saving in Furnace Gas Producer Kiln, per M brick.....		680 lbs.
Time saved.....		2 days 10 hours



Firing with Furnace Gas Producer
Note absence of smoke

INTERNATIONAL CLAY MACHINERY COMPANY, DAYTON, OHIO, U. S. A.

BURNS ANY KIND OF COAL

Same Kiln. Upper—Furnace Gas Producer. Lower—Ordinary Grates.

A Paving Block Kiln brought in the following:

"Suppose Mr. Underwood told you we figured we saved at least 3 days in burning and 20 tons of coal on this particular kiln, as we burned it in 5 days with 44 tons, and while our burning time is averaging 7 days, we feel that under the adverse weather conditions that we had, it would have taken at least 8 days and 65 tons of coal to burn the kiln.

"It goes without saying that we are very anxious to get the balance of the Producers that we have on order from you and will appreciate very much if you rush these to us at the earliest possible moment."

And, later the same company writing in says in part:

"Since writing our letter of the 17th, we have burned No. 1 again in 4 days and 19½ hours, compared with Mr. Underwood's burn of 5 days. We also showed a saving in coal compared with his burn, inasmuch as we used only 42½ tons. The saving effected between this burn and the average burning of our kiln was 38% in coal and 3 days time. No. 1 is burning for the third time and will be on 72 hours tonight at 5 o'clock and the way this kiln is progressing we believe we will cut the burning time still further."



Ordinary Grate Furnace on same plant. Note smoke

A Face Brick Manufacturer writes:

"We are pleased to advise you that the guarantee, which you made on the operation of the kiln, equipped with your Furnace Gas Producer, has been more than fulfilled. You guarantee to reduce our coal consumption 15% and to reduce our time of burning 15%.

"Averaging the results on the four burns, which we have completed on this kiln, shows a saving in fuel of over 30% and a saving in time of 40%.

"One of the most astonishing features in connection with this equipment is that after the water smoking period is past, you cannot detect any smoke coming from the stack.

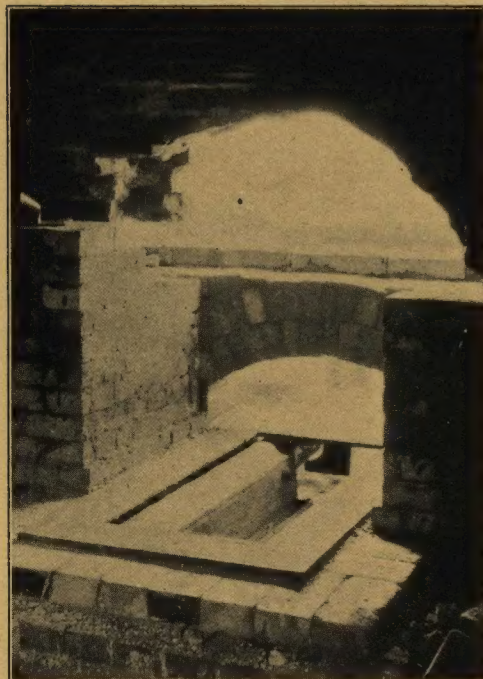
"As we become more familiar with the operation of this kiln, we believe we will be able to improve our present results."

INTERNATIONAL CLAY MACHINERY COMPANY, DAYTON, OHIO, U. S. A.

IT MINIMIZES SMOKE AND CLINKERS

A Sanitary Ware Manufacturer writes in part as follows.

"This you will note shows a saving of about 26% in fuel and 29% in time by using your Furnace Gas Producer. Furthermore, the item that appeals to us is that it has reduced our loss considerably and brings us through better ware. We are not bothered with the smoke in our kiln sheds when starting our fires, and it clarifies the atmosphere in our kilns, as we can see our cones and trials very much better with this system than the old."



Installation looking from inside of kiln—bag wall removed

A Boiler Installation in another case proved itself so efficient after several days operation that the user placed an order for over 100 Standard Furnace Gas Producers for use on his kilns.

The Furnace Gas Producer consists of a patented device made mostly of cast iron similar to the cut shown on page 2, the design and construction of which depends upon the particular conditions that are to be met. The cut shown is used on all ordinary periodic kilns of either updraft or downdraft type.

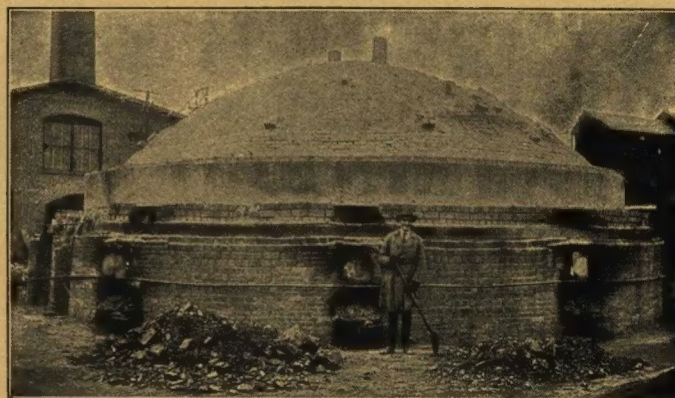
The only additional equipment required is a steam line feeding into each Furnace Gas Producer—a $1\frac{1}{2}$ " feed line will take care of as many as 12 to 20 furnaces, depending upon the

A Boiler Installation shows the following:

Test No. 1	Test No. 2
No. 1 Boiler Furnace Gas Producer	No. 2 Boiler Regulation Shake Grate
Root Water Tube	Root Water Tube
Horse Power.....80	Horse power.....80
Duration of test.....8 hours	Duration of test.....8 hours
Coal burned.....2072 lbs.	Coal burned.....2338 lbs.
Water evaporated.....15090 8 lbs.	Water evaporated.....12043.5 lbs.
" " per lb. coal. 7.27 lbs.	" " per lb. coal. 5.38 lbs.
Feed water temp.....190°	Feed water temp.....191°
Flue gas.....385°	Flue gas.....400°
Steam gauge press. av. 95 lbs.	Steam gauge press. av. 80 lbs.
Boiler h. p. developed. 55.44	Boiler h. p. developed. 44.27
% of rating developed. 69.8	% of rating developed. 55.34
Ashes.....300 lbs.	Ashes.....362 lbs.
Efficiency of boiler.....57.2%	Efficiency of boiler.....42.10%
CO ₂ average.....10.8%	CO ₂ average.....6.6%
Excess air.....81%	Excess air.....160%
Gain in Efficiency.....	26 $\frac{1}{4}$ %

It would seem that the benefits derived from the Furnace Gas Producers under Boilers are as follows:

- 1st. Practically smokeless.
- 2nd. Absolute control of draft conditions during light load periods.
- 3rd. Ability to develop more than nominal rating when necessary.
- 4th. Ability to burn any kind of coal economically.
- 5th. Economy of operation.



Down Draft Kiln Burning Paving Block with Furnace Gas Producer

INTERNATIONAL CLAY MACHINERY COMPANY, DAYTON, OHIO, U. S. A.

NO TUNNELING IS REQUIRED



Furnace Gas-Producer
Replacing a Gas
Tunnel System

length of the line. At each furnace a distributing line is tapped $\frac{1}{4}$ " in diameter controlled by a simple globe valve. A regular steam jet can be used or else a jet made by placing a cap over the end of the $\frac{1}{4}$ " pipe and drilling a $\frac{1}{8}$ " hole thru it.

No Tunnels: There are no underground tunnels of any kind required. No piping whatever, outside of the small steam line mentioned above. The Furnace Gas Producer supplied by us and the steam line furnished by the purchaser is the only equipment that is required.

HOW IT OPERATES

In starting up, a layer of ashes 2" to 4" thick is first thrown on top of the Furnace Gas Producer; the fire is then built on top of these ashes and the steam gently admitted. As the temperature increases, the volume of steam is increased till proper gasifying conditions are reached. The furnace door is then closed, and the firebox is operated as a gas producer. The gas is formed in the firebox, travels upward till it comes in contact with the secondary air for combustion, which is drawn in by the draft of the kiln through an opening in the kiln wall so that combustion takes place in the kiln proper, and not in the firebox, a long lazy flame similar to a natural gas flame resulting.

At each fresh charge of fuel, the volume of steam can be temporarily increased to prevent smoke.

The passing of the steam thru the fuel bed practically prevents clinkering, even with a high ash coal. The ashes come from the firebox in powder form free of carbon, another source of economy.

Where a coking coal is used, the ashes are dumped by dropping the trunnion, the fire bed itself arching over so that it will not fall in. In rare cases where the coal will not coke it is only necessary to run a shovel along the top of the bed plate and rake the ashes out, which is simply done.

Using the same coal in each case, you will find the volume of ashes much smaller than where regular grates are used.

Dumping of the ashes is required but once in every 24 to 48 hours, depending upon the quality of coal.

DURABILITY: The Furnace Gas Producer when properly operated is practically indestructible. It is fully protected from the fire by a layer of ashes, and is further cooled by the constant flow of steam and air through it, so that there is no chance for it to burn out.

INTERNATIONAL CLAY MACHINERY COMPANY, DAYTON, OHIO, U. S. A.

THE FURNACE GAS PRODUCER

In fact an experiment was tried on several installations. A linen shipping tag was left on the fire side of the Furnace Gas Producer in one case, where the burning temperature was 2800 deg. F. and in another at a temperature of 2500 deg. F. In each case, while the tag was crumpled by the weight of the fuel bed above it, it was found at the completion of the burn that the tag was not even charred.

STEAM REQUIRED

The amount of steam required is practically negligible—which can be seen from the fact that the nozzle opening is about $\frac{1}{8}$ " or smaller and with 60 pounds pressure, which is the lowest limit recommended, the controlling valve is never more than partially open, even at the highest temperatures of burning.

If a greater pressure is available, the jet can be reduced as the velocity of the steam is greater, and consequently less of the steam is required.

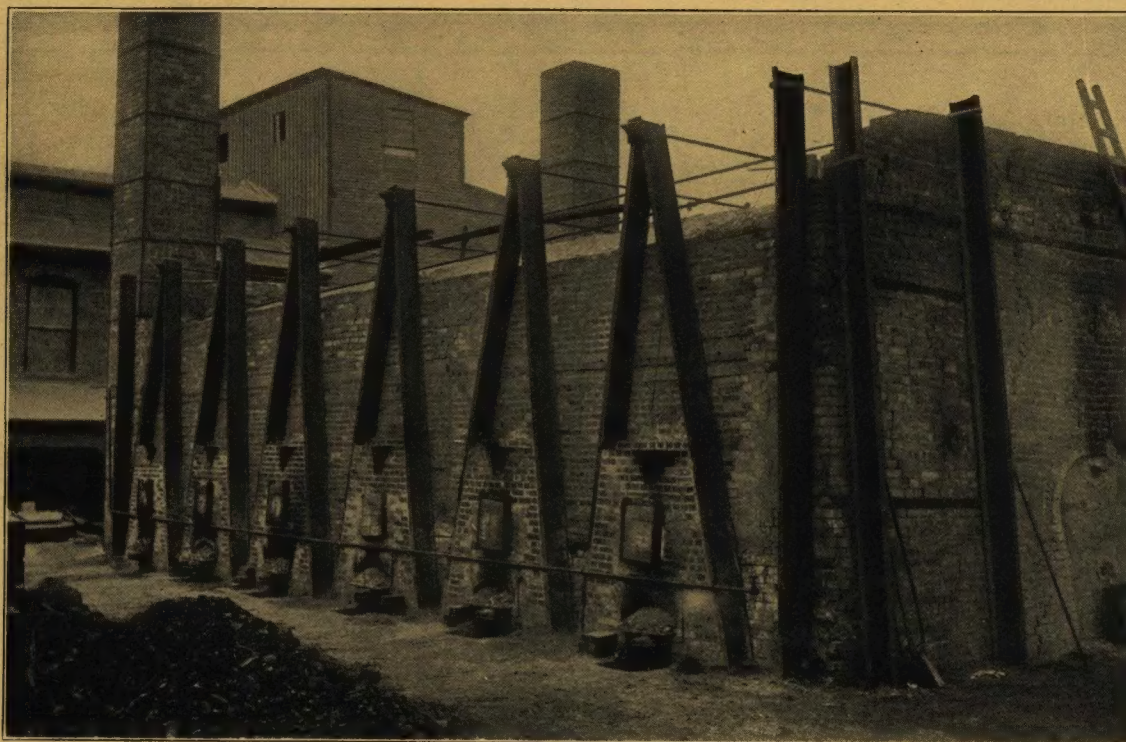
At one installation of 12 Furnace Gas Producers, where the steam was supplied from a small boiler used for heating purposes, the fireman advised that he did not notice any drain in the supply, even when the greatest volume of steam was being used at the kiln, and this was during the dead of winter.

INSTALLATION

The Standard Furnace Gas Producer for Periodic Kilns will fit, with few exceptions, any average fire box. The bed plate is 26" wide and it is only necessary to arrange the brick work in such manner so as to form a ledge, so that the bed plate of the Furnace Gas Producer can be rested on this ledge. It is a mason's job, and a kiln can be completely equipped between burns, so that there is no loss in time. No tunnels of any kind are required. Drawing shown on page 3 shows in detail the way the Furnace Gas Producer is set in the fire box, the arrangement of the ash pit, the fire doors and the opening for the secondary air for combustion. It will be noticed that this arrangement is the same that will be found in all average fire boxes in downdraft kilns.

For updraft kilns a slightly different arrangement is followed. It is just as simple to install it on boilers and other fire boxes, as it is in brick kilns.

TERMS OF SALE: The Furnace Gas Producer is sold outright at a standard price.



INTERNATIONAL CLAY MACHINERY COMPANY, DAYTON, OHIO, U. S. A.

Digitized by:



ASSOCIATION
FOR
PRESERVATION
TECHNOLOGY,
INTERNATIONAL

www.apti.org

**BUILDING
TECHNOLOGY
HERITAGE
LIBRARY**

<https://archive.org/details/buildingtechnologyheritagelibrary>

From the collection of:

**NATIONAL
BUILDING
ARTS
CENTER**

<http://web.nationalbuildingarts.org>